



Frederick County

Solid Waste Management Options Study

Phase 2 Report Summary Presentation: Detailed Analysis and Projected Costs of Selected Options 8 March 2017

Facilitated on behalf of the Solid Waste Steering Committee



Introduction to the Study Team



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Tom Ramsey



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Introduction to the Study Team



Solid Waste Steering Committee members pictured above (left to right): Chris Voell, Joe Richardson, Kai Hagen, Patrice Gallagher, Peter Blood, Chairman John Daniels, Phil LeBlanc, County Executive Jan Gardner, Ellis Burruss, and Don Briggs. Not pictured: David Gray and Pat Mylio (alternate).

Solid Waste Steering Committee

John Daniels - Chairman



www.frederickcountymd.gov/WhatsNext

Study Goals and Objectives

- Intended to inform the County's long-term planning and decision making
- Two-Phases
 - ✓ Phase 1 – Public Input and Evaluation of Options
 - ✓ Phase 2 – In-Depth Feasibility of Implementing Changes
- Active Sharing of Ideas through Transparent Process
- Focused on:
 - ✓ Residential and commercial trash
 - ✓ Recycling
 - ✓ Yard waste
 - ✓ Food waste

Brief Synopsis of Drivers for the Study

Maryland Recycling Act (MRA)

- The MRA establishes recycling and waste diversion goals for all Maryland Counties based on population
- To allow fair measurement across all counties, waste and recycling is divided into MRA and non-MRA materials
 - ✓ Frederick County MRA Recycling Rate is currently about 50%

Maryland Zero Waste Plan (ZWP)

- *“Zero Waste Maryland: Maryland’s Plan to Reduce, Reuse, and Recycle Nearly All Waste Generated in Maryland by 2040”*
- Issued December 2014
 - ✓ 80% overall recycling goal
 - ✓ 90% recycling goal for food scraps
 - ✓ 90% recycling goal for yard trimmings
 - ✓ 85% diversion goal
- Incremental goals set between 2015 and 2040

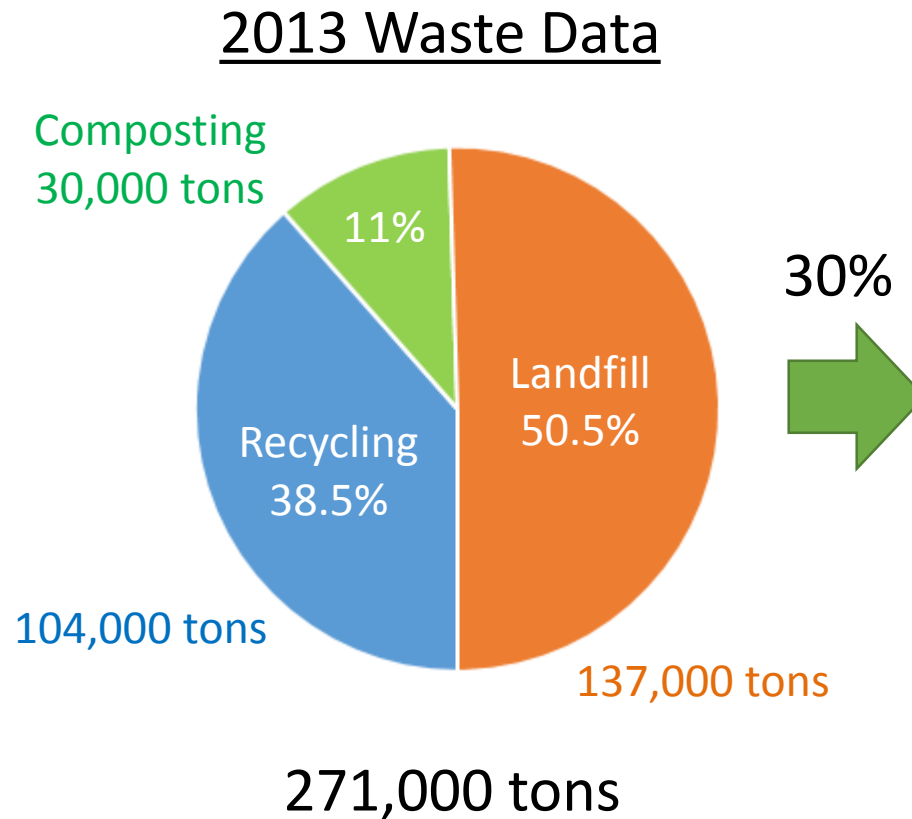
Where Does the County Need to Get To?

Study Goal: Achieve the ZWP Recycling Targets by 2025 (and 2040)

Category	Current Rate	Required Rate by 2025	Improvement Needed	Required Rate by 2040	Improvement Needed
Overall Waste Diversion	55%	70%	15%	85%	30%
Overall Recycling	50%	65%	15%	80%	30%
Food Waste Recycling	<5%	60%	~60%	90%	~90%
Yard Waste Recycling	Very High	80%	Minor	90%	Minor

Where Does the County Need to Get To?

Study Goal: Achieve the ZWP Recycling Targets by 2025 (and 2040)

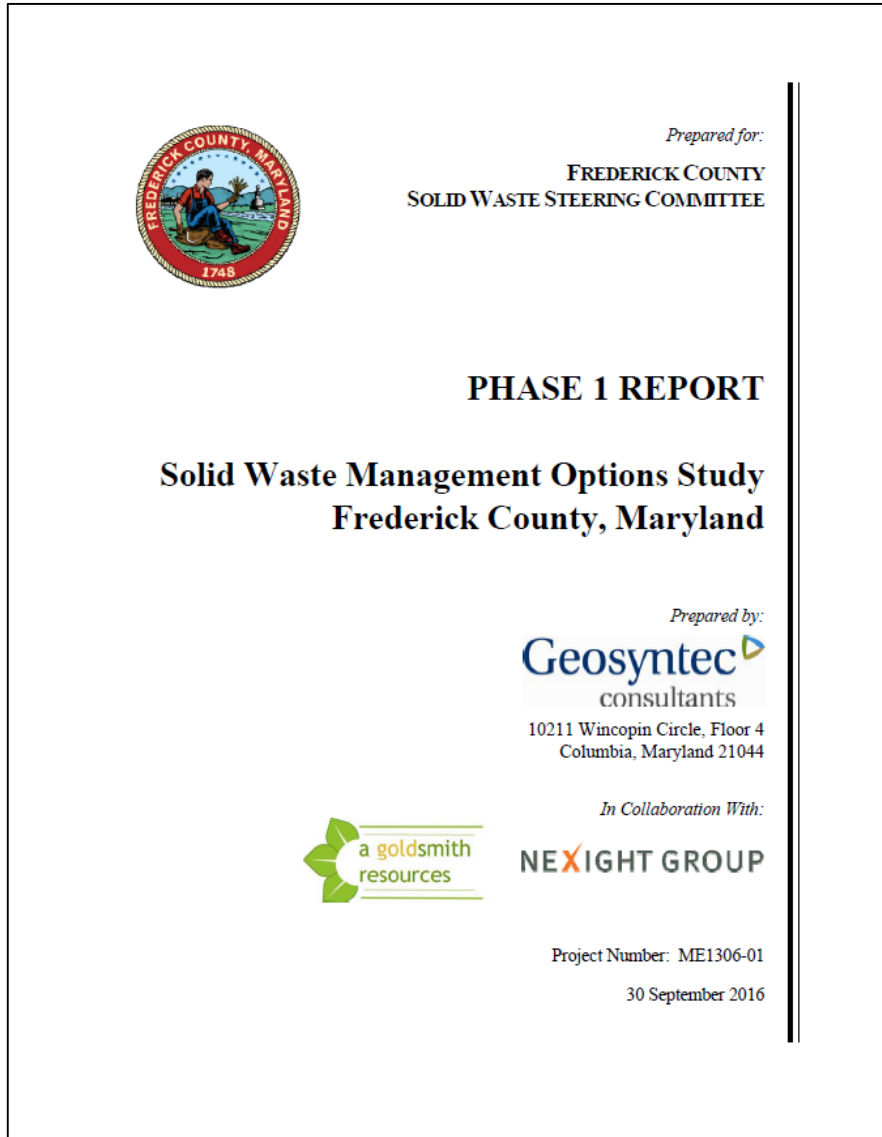


Target

Need to Recover at Least an Additional 40,000-45,000 tons/year of Materials Currently in the Landfill Waste Stream:

- ✓ Food waste
- ✓ Yard waste (if any)
- ✓ Recyclables
- ✓ Other Material Recovery and Reuse

Options Recommended from Phase 1



1. Expanded recycling program at public schools
2. Food waste collection from restaurants
3. Residential three-bin food/yard waste collection
4. Food waste co-digestion at expanded Ballenger-McKinney WWTP
5. Community-scale (decentralized) composting
6. Large-scale (centralized) composting
7. Resource recovery park

- Task 2.1 – Options Screening and Feedstock Specification
- Task 2.2 – Scoping Four-Season Waste Sort*
- Task 2.3 – Financial Modeling and Detailed Analysis
- Tasks 2.4 – Draft Phase 2 Report
- Tasks 2.5 – Present Draft Phase 2 Report
- Task 2.6 – Final Report

* Not performed as part of Phase 2: waste sorts are expensive and the options to be evaluated in detail in this phase will not benefit much from analysis of raw MSW at this stage

Options **Not** Selected for Detailed Analysis (Task 2.1)

1. Large-scale (centralized) composting

- Undue capital risk; better to demonstrate County's ability to divert food waste
- Little national experience with food waste composting at this scale
- RRP option includes large-scale composting facility

2. Food waste co-digestion at expanded Ballenger-McKinney WWTP

- Some experience nationally
- Timing and specifications for plant expansion are uncertain

3. Expanded recycling program at public schools

- Single-stream recycling is required under existing Public Schools Recycling Plan (PSRP)
- Expansion and improvement of PSRP is important, but not a specific goal for analysis in Phase 2
- Phase 2 will focus on food scraps recovery and composting

Options Selected for Detailed Analysis (Task 2.3)

1. Single Stream Organics Collection
 1. Public schools
 2. Restaurants
 3. Residential three-bin food/yard waste (single family homes)
2. Community-scale (decentralized) composting
3. Resource recovery park

Chapter 1: Introduction

Chapter 2: Technology Screening and Benchmarking

Chapter 3: Incremental Phase-in of Selected Options

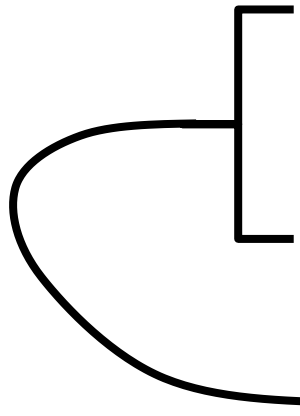
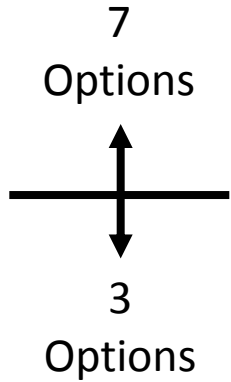
Chapter 4: Detailed Financial Modeling and Analysis

Chapter 5: Model Results and Sensitivity Analysis

Chapter 6: Summary and Recommendations

Two Models:

1. Source-Separated Organics (SSO) Collection and Composting Program
2. Resource Recovery Park



Potential Contracting Mechanisms

Option	Potential Contracting Mechanism			
	County Owned and Operated	Private	DBO Contract	Franchise Agreement
SSO Collection Programs (Decentralized)	Suitable	Suitable	Unsuitable	Preferable
Composting Facilities (Decentralized)	Suitable	Suitable (individual facilities only)	Preferable	Unsuitable
Resource Recovery Park (Centralized)	Suitable	Unsuitable	Suitable	Unsuitable

DBO = Design, Build, Operate (Public-Private Partnership)

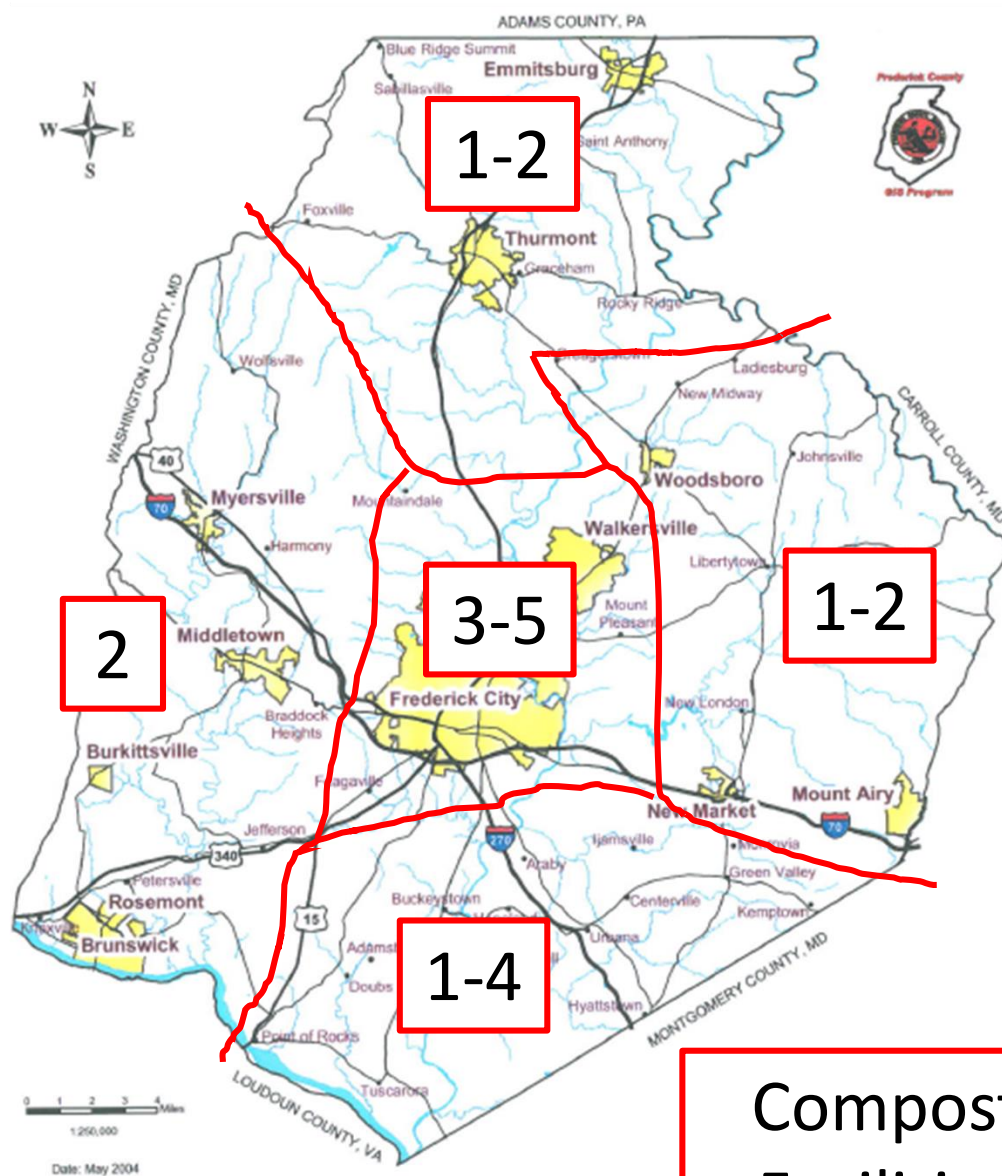
Recommended Implementation Schedule (Baseline Assumptions)

Voluntary
↑
↓
Mandatory

Phase	Publics Schools	Frederick City Restaurants	Frederick City Residents (SFHs only)	Other County Restaurants	Other County Residents (SFHs only)	Other Businesses and MFDs
Pilot	Pilot (10%)	Pilot (20%)				
Phase I	100%	100%	Pilot (20%)			Negotiate individually with owner(s)*
Phase II			50%	Pilot (10%)		
Phase III			100%	50%	Pilot (10%)	
Phase IV				100%	50%	
Phase V					100%	

* Not accounted for in model

Compost facilities limited to 10,000 CY/year output
Covered Aerated Static Piles (ASPs)



Population Estimate – January 2017

JURISDICTION	POPULATION (2016 ESTIMATE)	PERCENT OF TOTAL
Frederick City	68,867	27.7%
Brunswick	6,742	2.7%
Thurmont	6,209	2.5%
Walkersville	5,870	2.4%
Middletown	4,336	1.7%
Mt. Airy (Frederick County portion)	3,785	1.5%
Emmitsburg	2,814	1.1%
Myersville	1,713	0.7%
Woodsboro	1,148	0.5%
New Market	1,120	0.4%
Rosemont	294	0.1%
Burkittsville	151	0.1%
Outside Municipalities	146,005	58.6%
TOTAL	249,054	100.0%

Source: <https://frederickcountymd.gov/1479/Population-Estimates>

Estimates are based on April 2010 U. S Census data and calculated forward based on residential building permit data

Compost
Facilities

FREDERICK COUNTY POPULATION AND
ADMINISTRATIVE STRUCTURE

Geosyntec[®]
consultants

COLUMBIA, MARYLAND

DATE: 13 FEBRUARY 2017

PROJECT NO. ME1306-02

FILE NO.

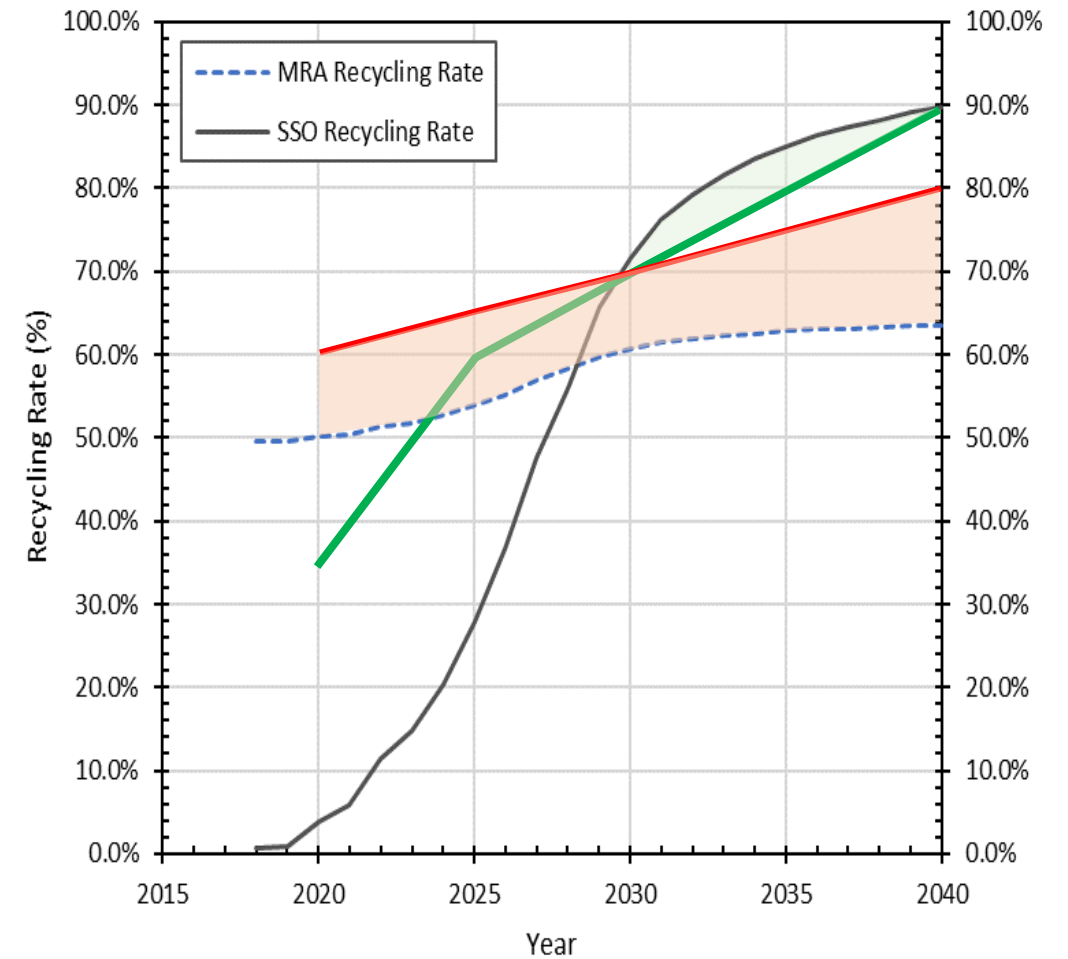
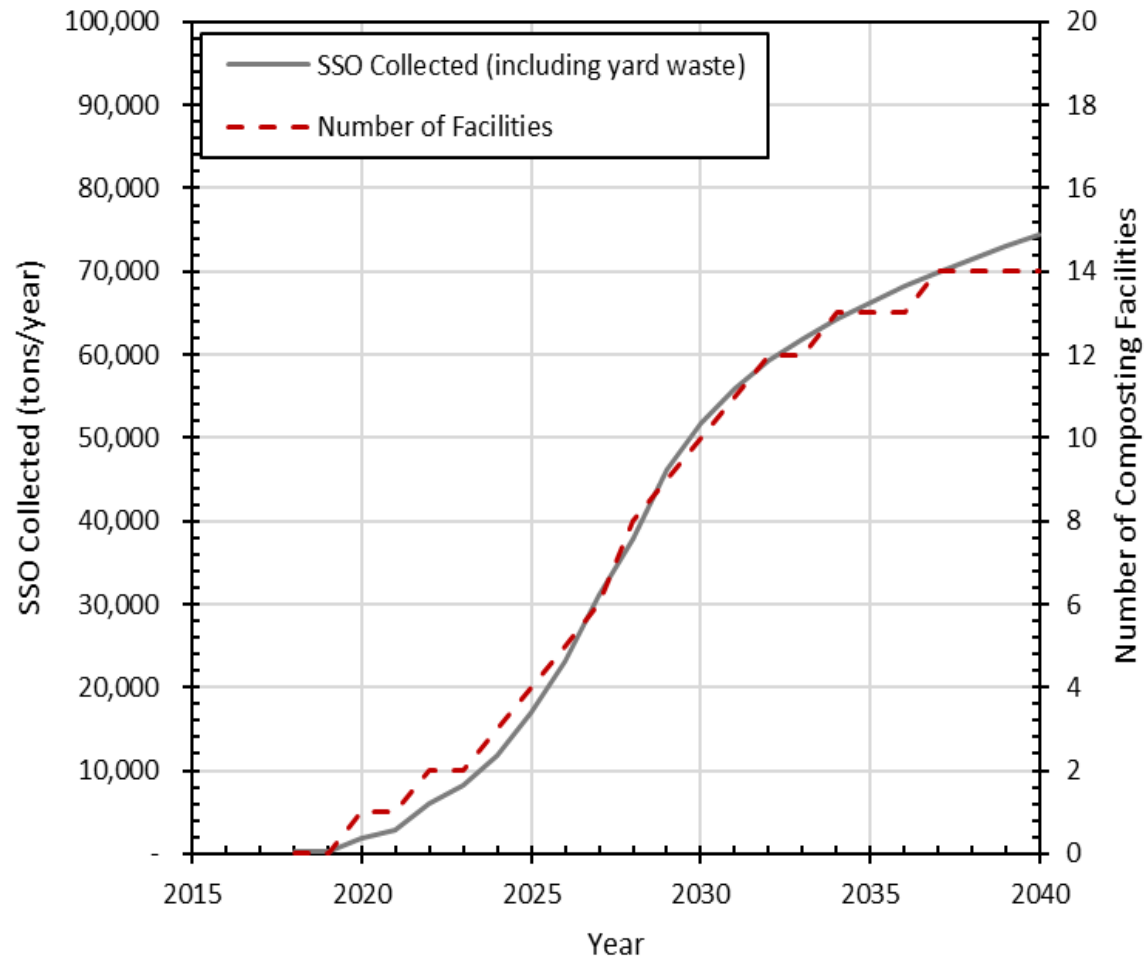
FIGURE NO. 3-1

SSO Program: Model Input and Assumptions

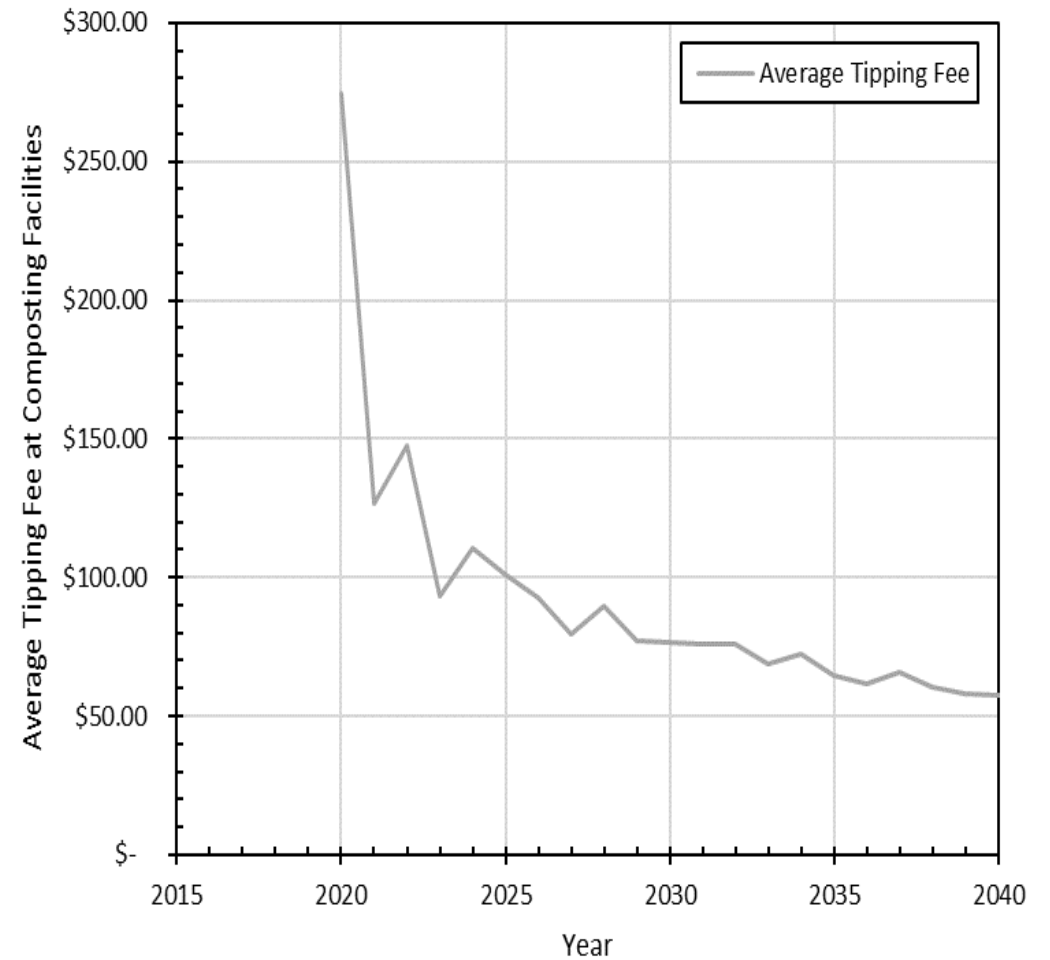
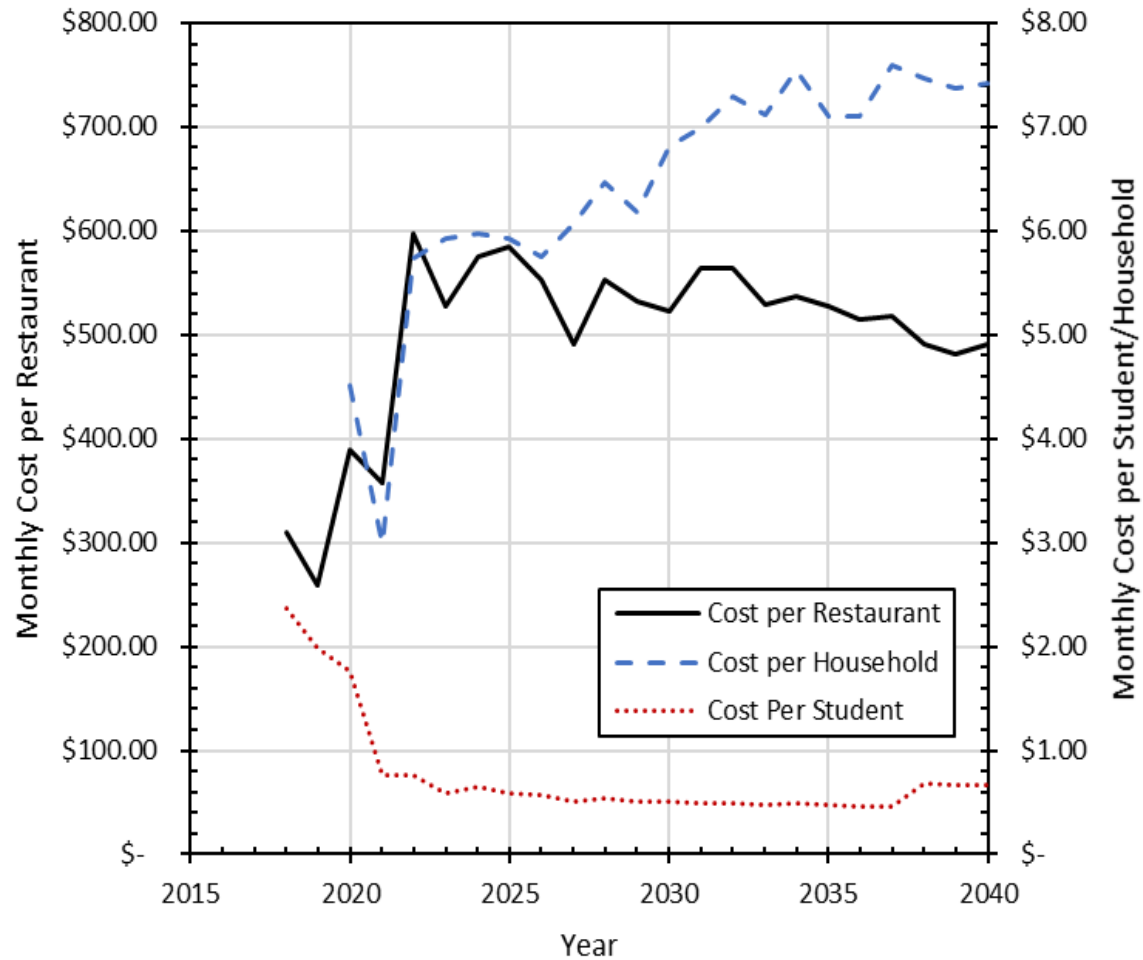
Goal: Estimate performance over service lifecycle through 2040

- Unit cost (per-household, per-student, per-restaurant)
- MRA waste and organics recycled, Change in County's recycling %
- Assumptions for Organics Generation and Capture Rates
 - Schools, Restaurants, SFHs; Effect of Voluntary vs. Mandatory
- Capital Expenditure on Organics Collection
 - Bins, Dumpsters, Collection Trucks (10 CY capacity, e.g. Ford F-650)
- Operating Costs for Organics Collection
 - Labor, Fuel, Truck Maintenance, Tipping Fee, Education/Outreach, Enforcement
- Capital Expenditure on Composting Facilities
 - Land, Engineering/Site Prep, Compost System, Equipment, Utility Connections
- Operating Costs for Composting Facilities
 - Labor, Fuel, Maintenance, Utilities, Disposal of residues

SSO Program Model: Summary of Performance



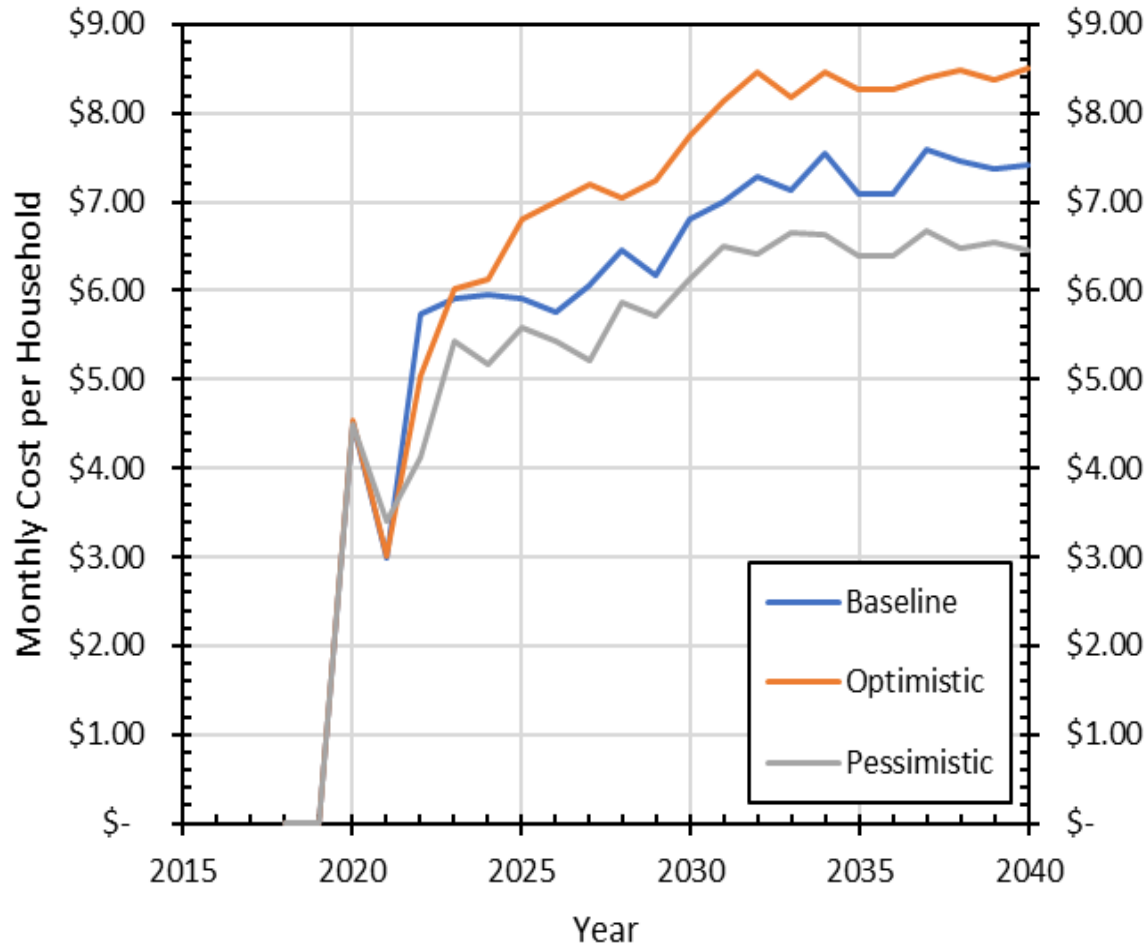
SSO Program Model: Summary of Costs



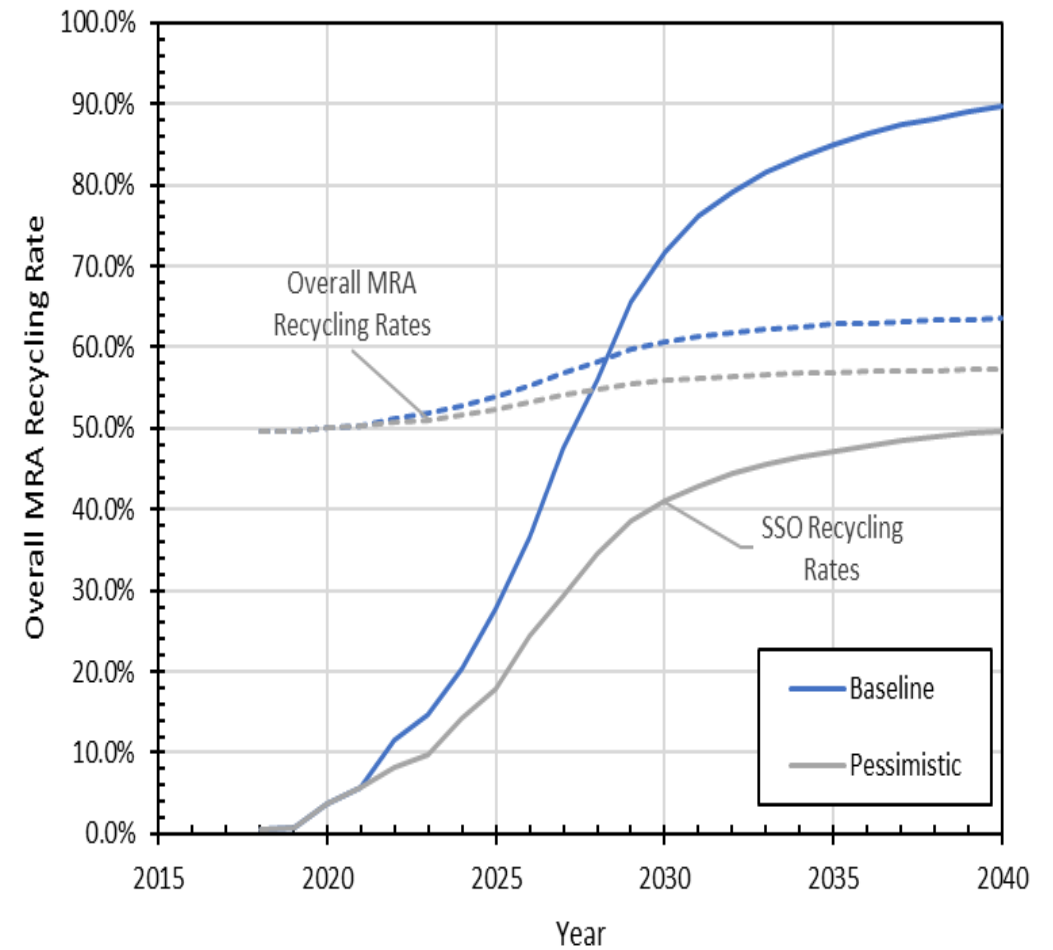
SSO Program Model: Sensitivity Analysis

- Variables assessed in sensitivity analysis:
 1. Organic fraction of MRA waste
 2. Fuel costs
 3. Compost residuals requiring disposal (efficiency of composting)
 4. Compost selling price and the fraction of compost product sold
 5. Implementation schedule (i.e. length of each phase)
 6. Voluntary versus mandatory participation
- For each variable, an optimistic and pessimistic value above and below the expected baseline value was chosen
- Findings
 - Highly sensitive to voluntary vs. mandatory participation
 - Sensitive to organic fraction of MRA waste (→ more collection)
 - Sensitive to composting efficiency (→ more facilities required)
 - Robust to other variables

SSO Program Model: Sensitivity Analysis



Effect on Cost per Household of Varying Organic Fraction of MRA waste



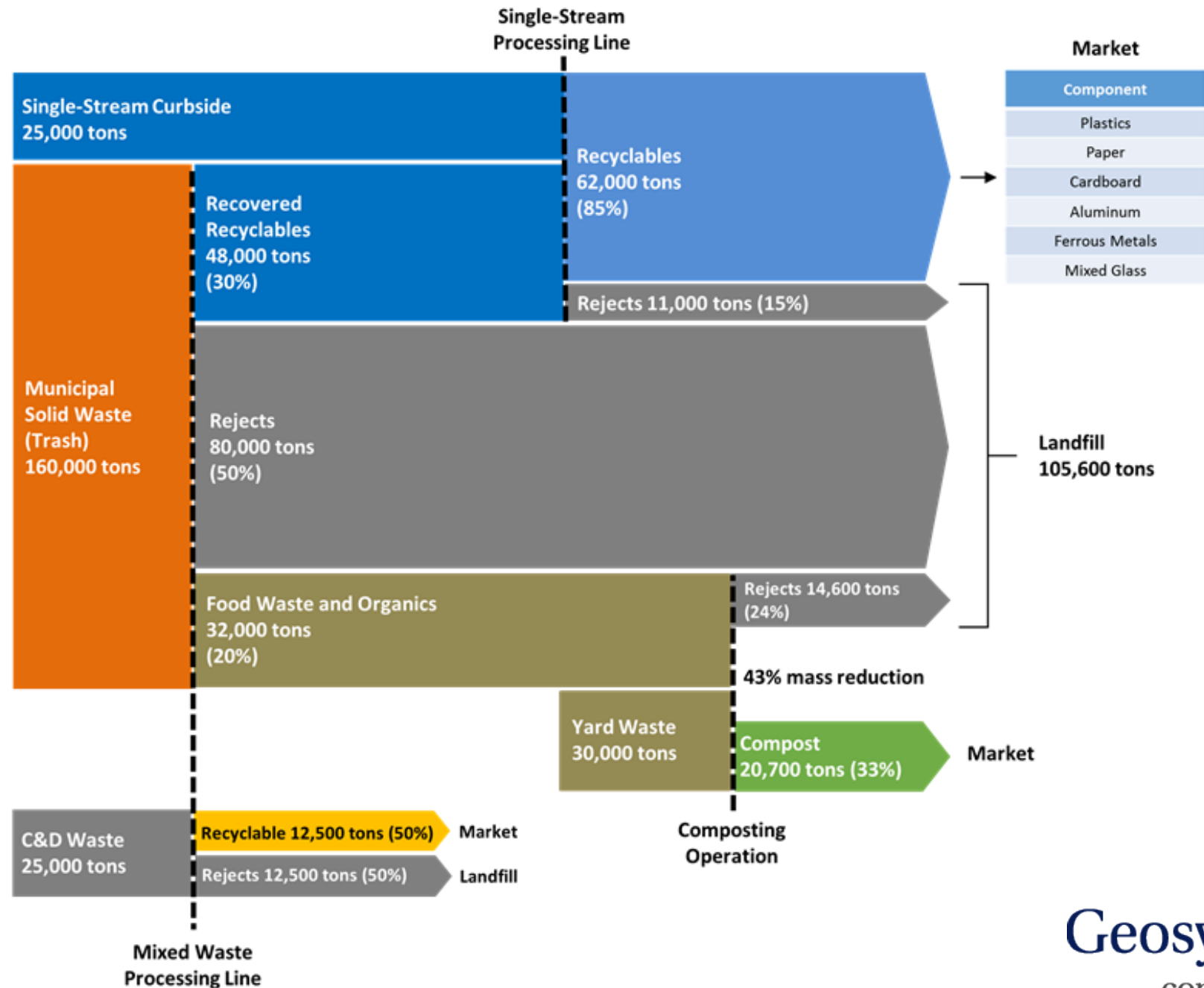
Effect on Recycling Rates of Voluntary vs. Mandatory Participation

Centralized Resource Recovery Park (RRP) Model

- Assumptions

- Existing S-S curbside recycling program and other recycling activities remain
- RRP includes
 - Materials recovery facility (MRF) with separate lines for processing existing quantities of S-S materials and mixed waste
 - Includes C&D recycling (non-MRA waste)
 - MRF must be compatible with future expansion of S-S recycling to multi-family units and implementing a three-bin program for separate recovery of organics from schools, restaurants, and SFHs
 - Large-scale compost facility (CF) for processing separated organics
- Not scalable: Sized for 25-year service (nominally through 2040)
 - MRF: Final throughput = 250,000 tons/year (estimate for 2016 = 210,000 tons)
 - CF: Final capacity = 80,000 tons/year (Covered ASPs)
- Capital costs about \$66M (\$44M for MRF, \$22M for CF)

RRP: Material Mass Balance Assumptions



RRP Model: Model Input and Assumptions

Goal: Estimate performance over service lifecycle through 2040

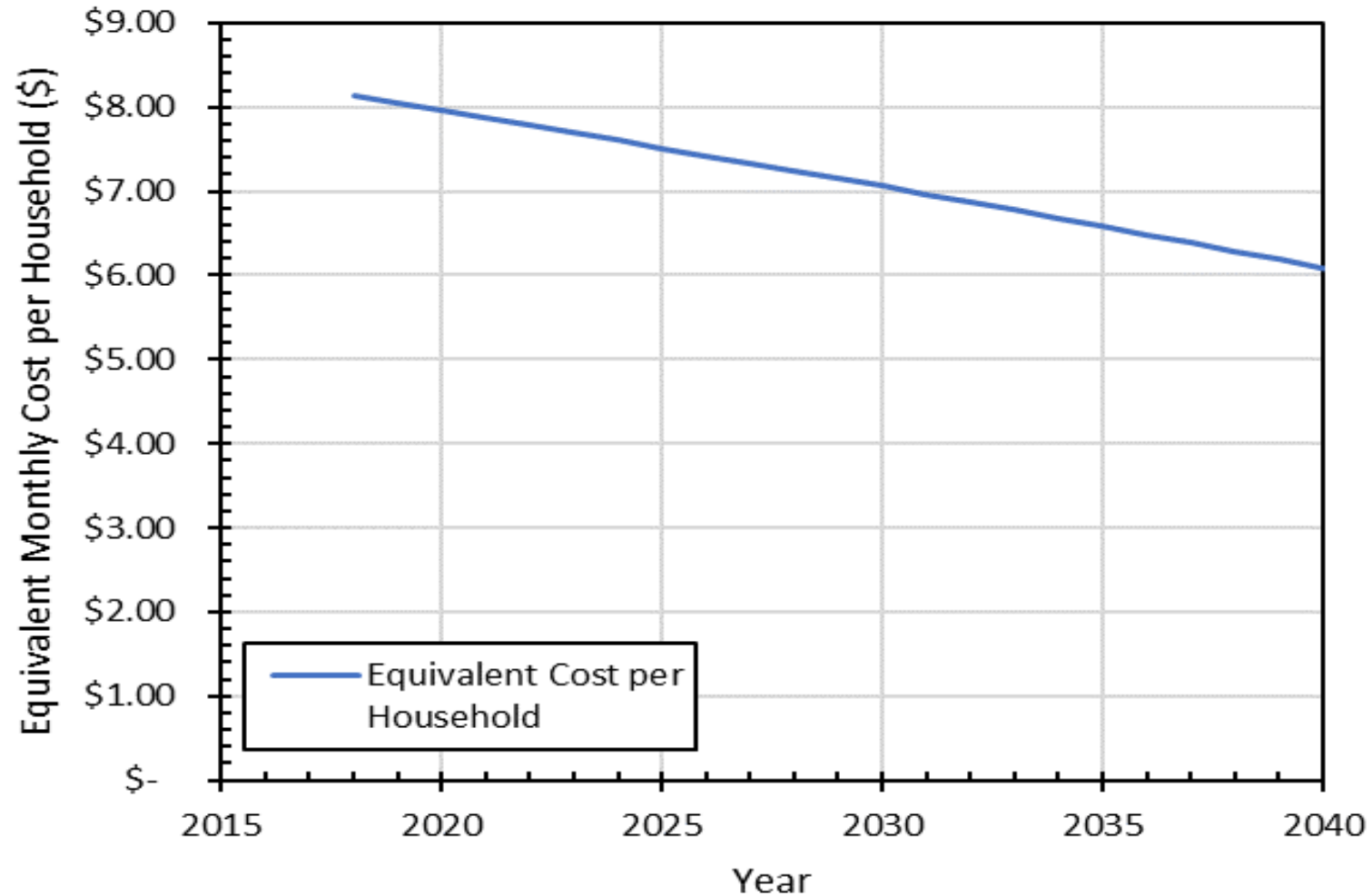
- Unit cost (equivalent cost per household)
- MRA waste and organics recycled, Change in County's recycling %
- MRF Development
 - Operating schedule, Service life, Max. annual throughput, Equipment needs
 - Capital expenditure, Operating costs
- CF Development
 - Operating schedule, Service life, Max. annual throughput, Equipment needs
 - Capital expenditure, Operating costs
- Land Acquisition/Lease Payments
- Revenues
 - MRF: Tipping fees (MSW, C&D, S-S), MPI (Mixed Recyclables), C&D Recycling
 - CF: Tipping fees (SSO, Yard waste [\$0]), Compost product sale

RRP Model: Summary of Performance

Predicted Recycling Rates (Baseline Assumptions)

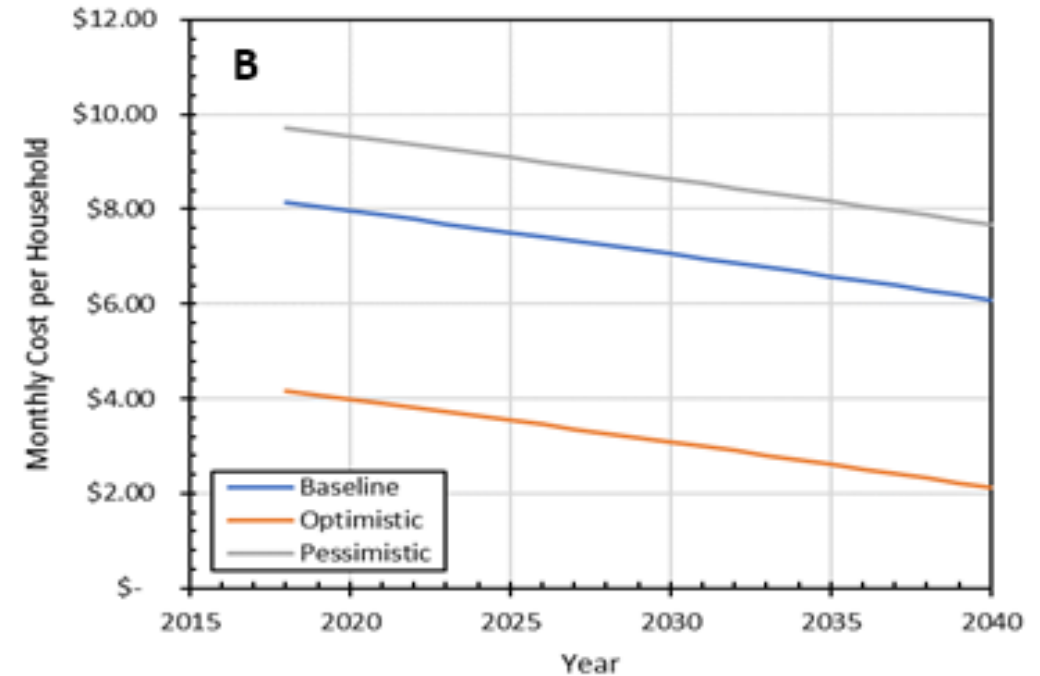
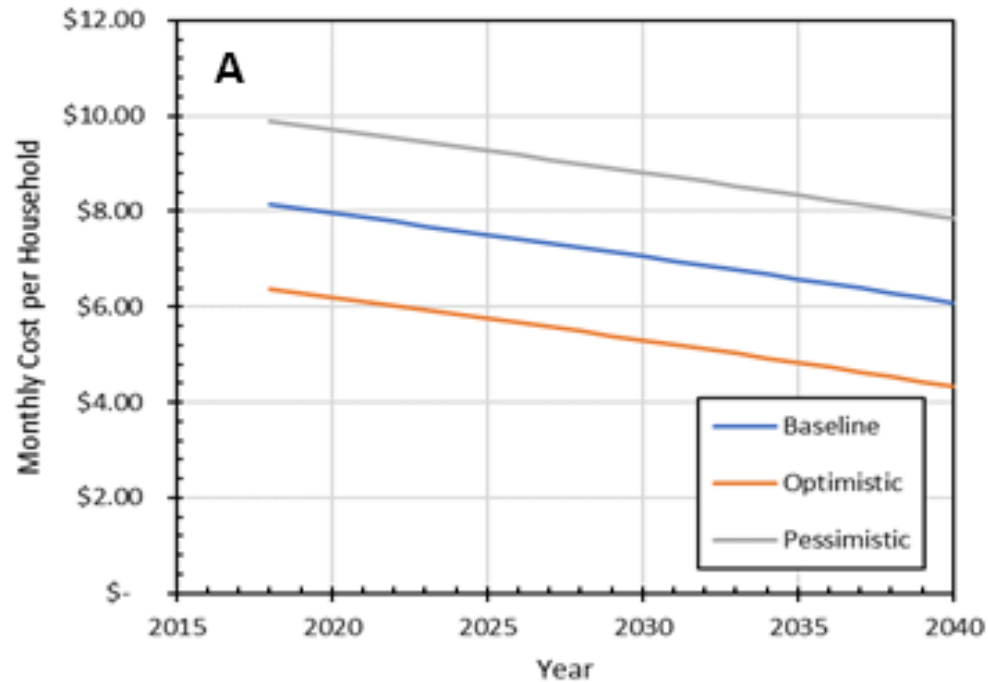
Recycling Goals and Expected Rates	2020	2025	2030	2040
Overall MRA Recycling Goal	60%	65%	70%	80%
Predicted Total MRA Recycling Rate	73%	73%	73%	73%
MRA Recycling Goal for Food Scraps	35%	60%	70%	90%
Predicted Organics Recycling Rate	65%	65%	65%	65%

RRP Model: Summary of Costs



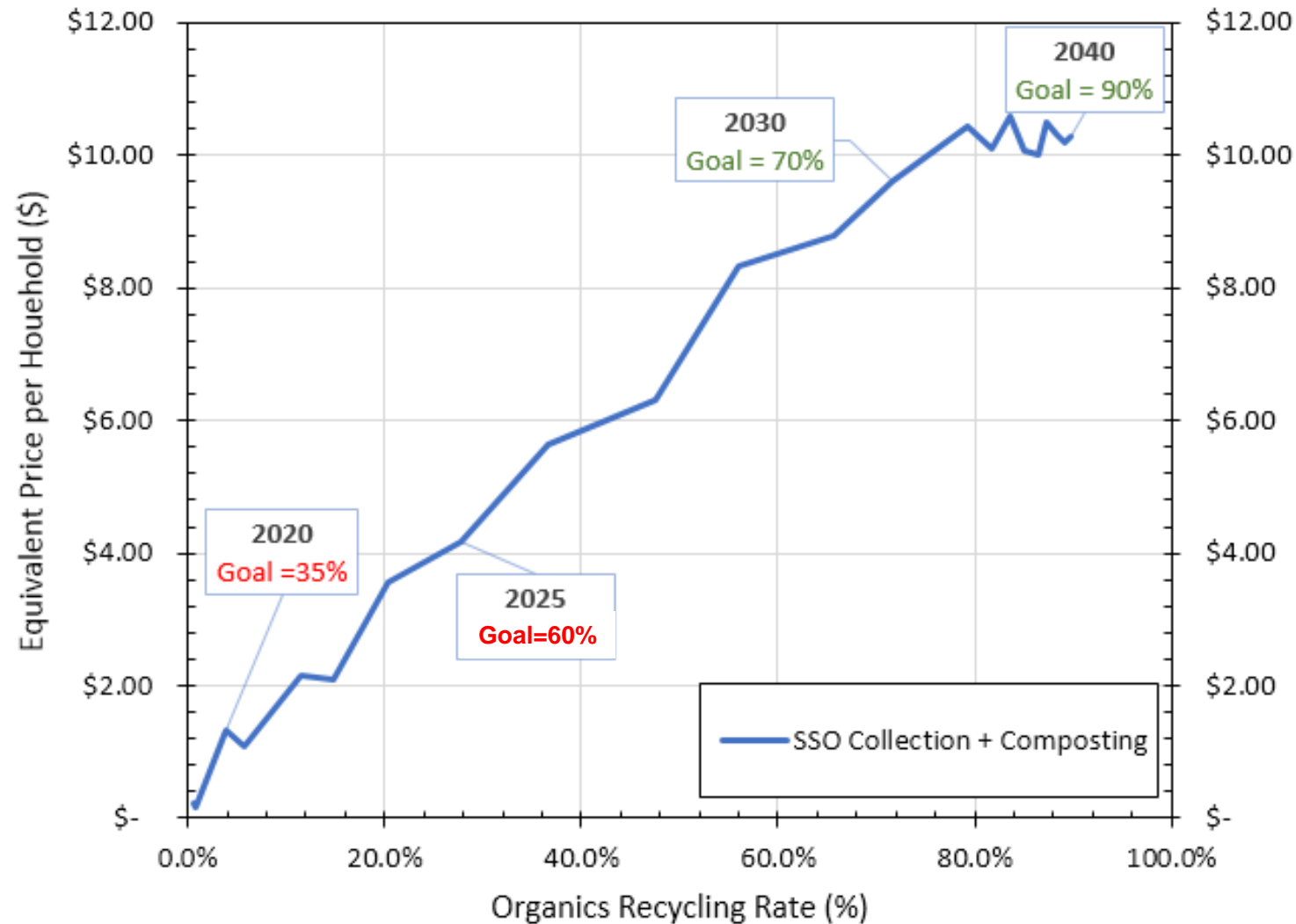
- Variables assessed in sensitivity analysis:
 1. Organic fraction of MRA waste
 2. Organics recovery rate from mixed waste processing line
 3. Recyclables recovery rate from mixed waste processing line
 4. Market price index (MPI) for mixed recyclables
 5. Compost residuals requiring disposal (efficiency of composting)
 6. Compost selling price and the fraction of compost product sold
- For each variable, an optimistic and pessimistic value above and below the expected baseline value was chosen
- Findings
 - Costs are highly sensitive to MPI
 - Recycling rates are highly sensitive to organic content of MRA waste
 - Recycling rates are highly sensitive to MRF mixed waste processing efficiency
 - Robust to other variables

RRP Model: Sensitivity Analysis

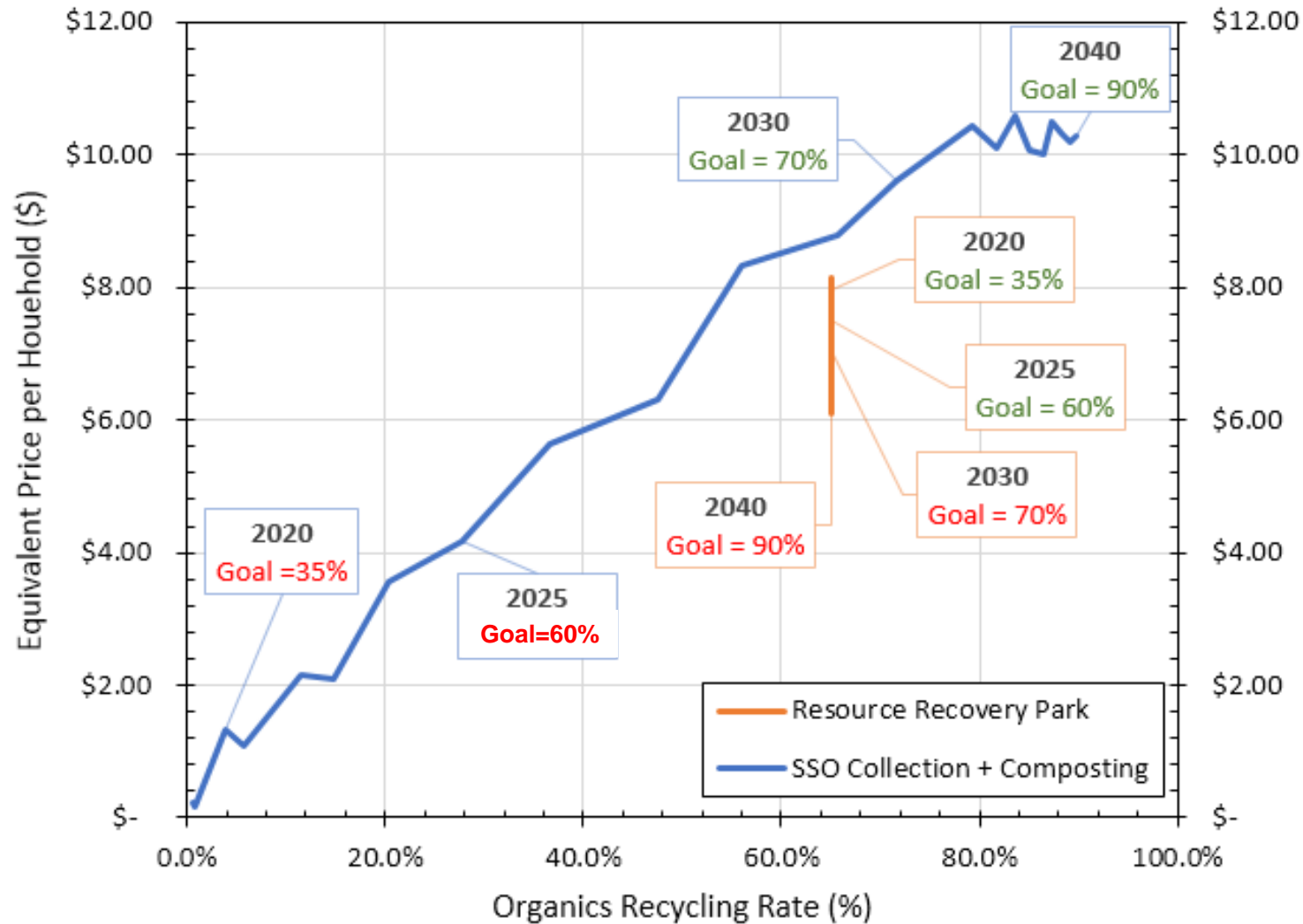


Variation in Equivalent Cost per Household as a Result of (A) Varying the Efficiency of Recyclables Recovery at the RRP and (B) Varying the MPI

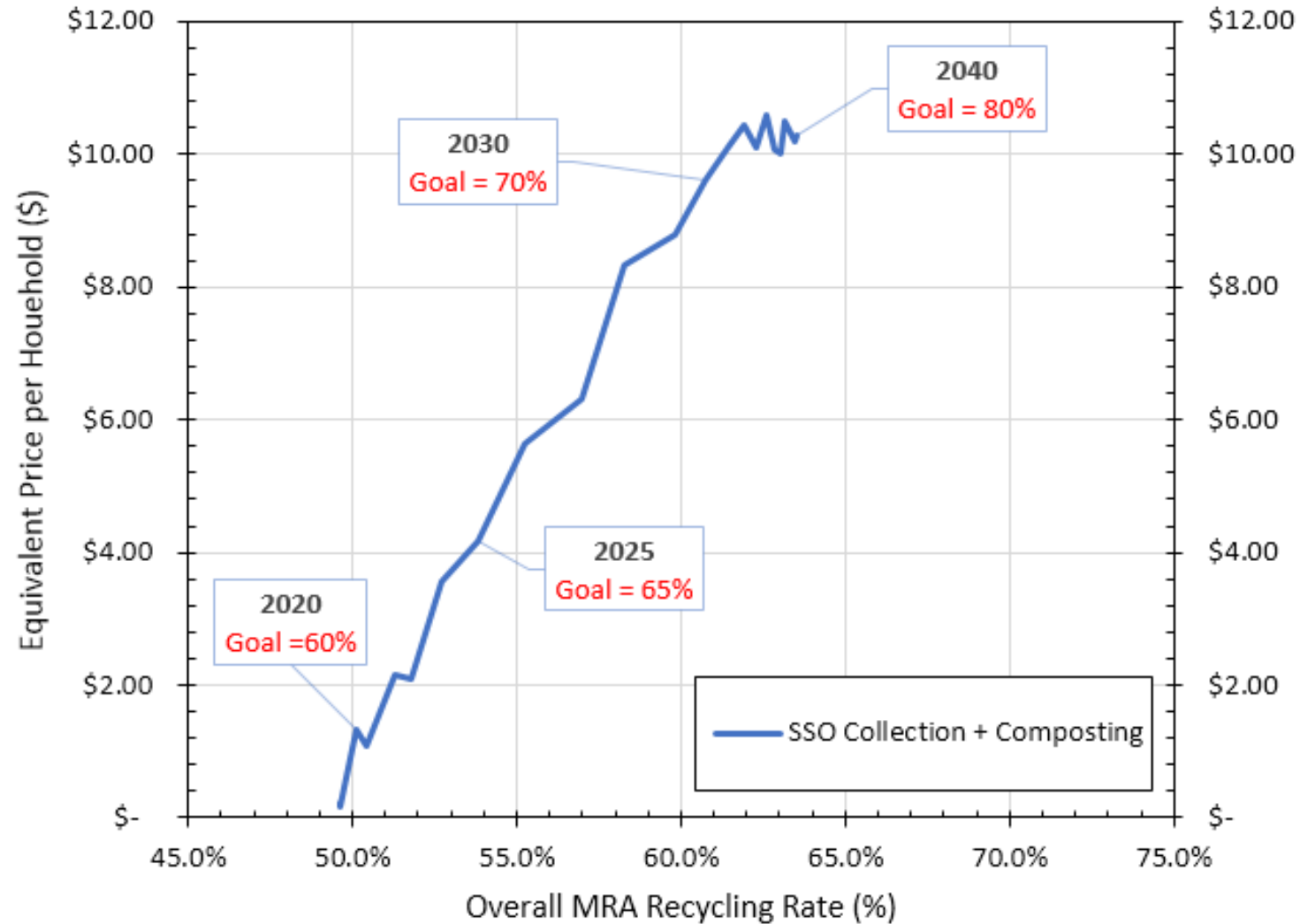
Comparative Analysis between SSO Program and RRP



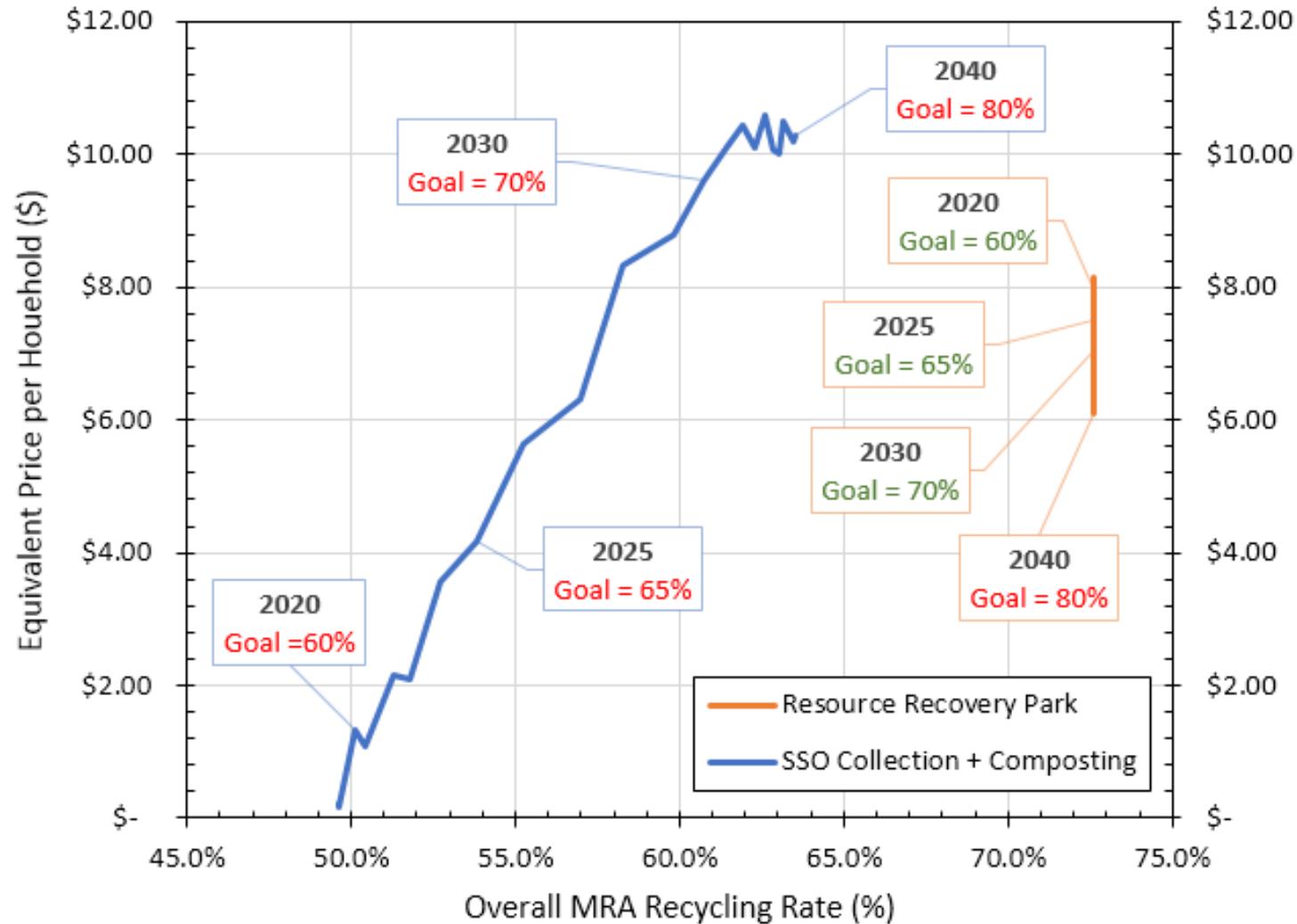
Comparative Analysis between SSO Program and RRP



Comparative Analysis between SSO Program and RRP



Comparative Analysis between SSO Program and RRP



SSO Program is Recommended over RRP Project

1. Comparative Costs

- RRP is highly capital intensive, no ramp-up period of demonstration before significant capital outlay
- SSO Program allows for gradual increases in costs only as the program matures and success is demonstrated
- SSO Program is more cost-effective than RRP in NPV terms: \$49M vs. \$57M

SSO Program is Recommended over RRP Project

2. Achieving Goals

- SSO Program is a closer match to majority of public opinion in Phase 1
- SSO Program meets its core objective directly (90% organics recycling)
- RRP does not fully meet either the organics or MRA waste recycling objective

SSO Program is Recommended over RRP Project

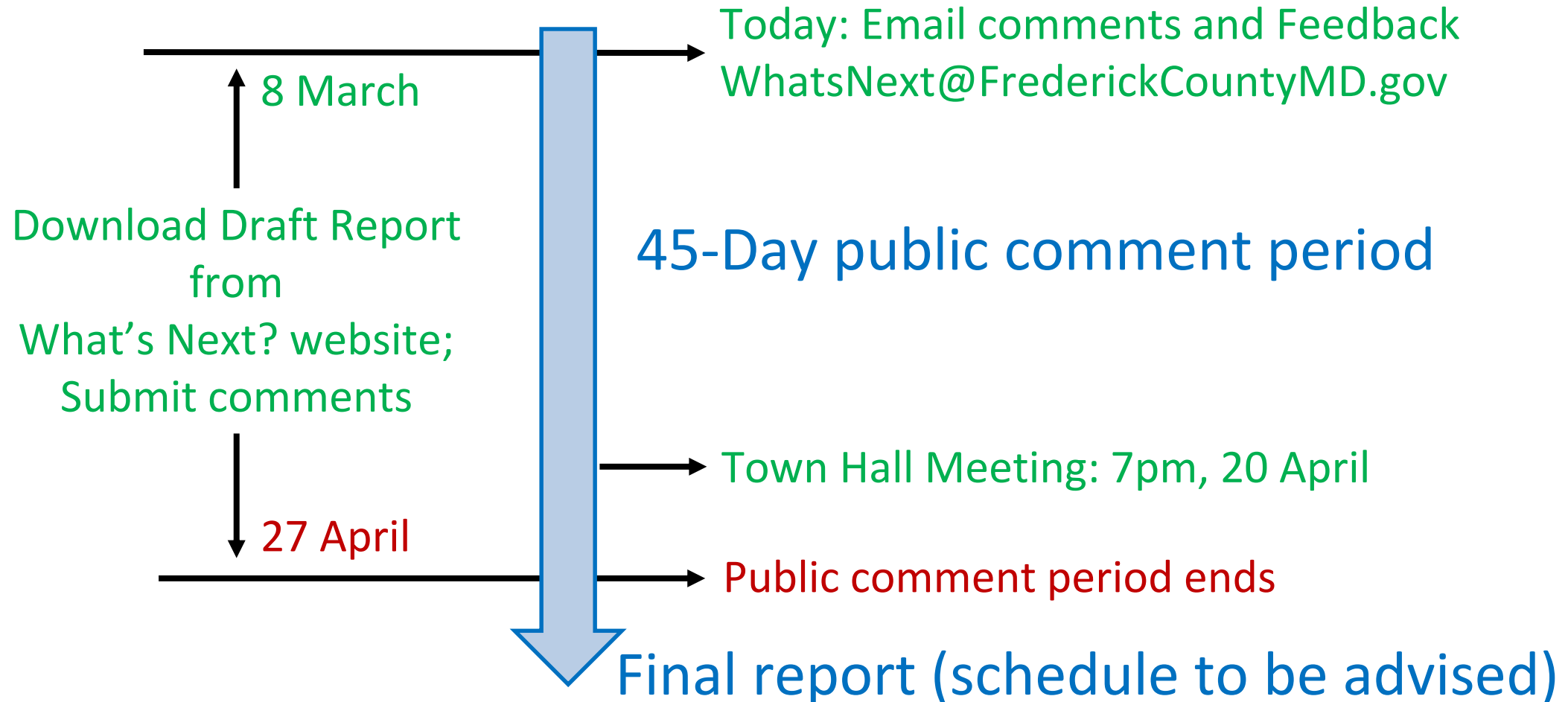
3. Performance and Market Factors

- RRP is highly sensitive to market price index (MPI) for mixed recyclables – better to keep this as external risk to the County (ship to private MRF)
- RRP is highly sensitive to performance of MRF mixed waste processing line, which has been drawn into question based on current operational data

Limitations and Observations on SSO Program

1. To meet 90% organics diversion goal within ZWP timeframe, County must be committed to mandatory SSO program
2. Need to conduct detailed study on SSO generation, preferably as part of pilot program
3. Composting operations are sensitive to yard waste (or other bulking agent) availability
4. Demand for compost is assumed to be sufficient, but this is a significant risk; County needs to conduct a detailed market study

Phase 2: Remaining Opportunities for Public Participation





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